

Analyzing Undergraduate Dental Students' Learning Approaches in Context with their Educational Environment: A Cross-Sectional Study

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Abstract

Background/aim: Dental students' learning approaches and perceptions of their educational environment vary across different academic years. The present study aimed to analyze dental students' learning approaches and their perception of the educational environment across four years of education. **Materials and methods:** This was a cross-sectional, questionnaire-based descriptive study among 354 Bachelor of Dental Surgeon (BDS) students from all four academic years of a medical institution from February to March 2024. We used the ASSIST (Approaches and Study Skills Inventory for Students) short-form questionnaire to analyze the learning approaches and the DREEM (Dundee Ready Education Environment Measure) questionnaire to analyze perceptions of the educational environment. Self-administered Google Forms were used to collect data, which was analyzed using descriptive statistics and compared between groups with unpaired t-tests. **Results:** Third-year students demonstrated the highest deep learning approach (mean 24.67 ± 2.74), while strategic learning approaches showed an improvement in the second year (mean 22.95 ± 4.10) and then declined in the fourth year. The mean score of the surface approach remained stable across the years. Gender-based analysis showed that females used more strategic approaches than males ($p = 0.042$). The students attributed the highest confidence in the DREEM score to their academic self-perception (63.9%) and the lowest confidence to their social perception (52.17%). The overall DREEM score of 121/200 (50.5%), which was within the range of 101-150, is suggestive of a more positive educational environment than negative. **Conclusion:** The ASSIST and DREEM analyses reveal certain areas that require improvement, including student-centered teaching approaches, supportive educational environments, improved communication and stress management resources. This will help to improve knowledge retention and clinical skills, thereby directly improving the quality of patient care among dental students.

Key words: dental education, learning approaches, surface approach, deep approach, strategic approach, perception, cross-sectional study, educational environment, ASSIST questionnaire, DREEM questionnaire

1. Introduction

The primary goal of undergraduate dental education is to produce dental practitioners who meet acceptable standards in addressing community oral health needs and enhancing the overall oral health of the population [1]. The learning approaches of students significantly influence the success of their educational experience in higher education [2]. The Approaches and Study Skills Inventory for Students (ASSIST) short-form questionnaire measures the three perceptual learning approaches—the deep, strategic and surface approaches [3]. Students approach their learning in various ways based on the nature of their relationship with their learning environment [4]. The Dundee Ready Education Environment Measure (DREEM) is a validated tool to assess the student's perception of their education environment [5,6]. There is a dearth of published data on dental students, particularly from our region of the world. So, this study aims to assess dental students' learning approaches and perceptions of their educational environment using the ASSIST and DREEM questionnaires.

2. Materials and methods

2.1. Study design and setting

This was a cross-sectional, questionnaire-based descriptive study conducted in a medical college from February to March 2024.

2.2. Participants

The target population consisted of 354 Bachelor of Dental Surgery (BDS) students from all four academic years. The study included all students who agreed to participate and completed the questionnaire. The study excluded respondents who had studied in the institution for less than 6 months and those who refused to participate or did not fill out the questionnaires.

2.3. Ethical considerations

After getting permission from the Institute's ethics committee, each participant provided written informed consent.

2.4. Data collection

We collected data through self-administered, anonymous questionnaires from students using Google Forms to minimize bias, ensuring that the presence of faculty did not influence their responses. The participants completed a demographic questionnaire that included features such as gender, the year of study and discipline and the assessment tools.

2.5. Assessment tools

The 18-item Approaches and Study Skills Inventory for Students (ASSIST) short-form questionnaire, with six questions in each of the three scales, was used to measure the deep, strategic, and surface learning approaches. A subscale describes the content of the items below it. The deep approach is defined as the extent to which the student monitors the development of his understanding. In the surface approach, the majority of learning involves memorization of information rather than comprehension, which leads to a superficial retention of knowledge. In this approach, students prioritize obtaining a qualification over comprehending the concepts and subjects. In a strategic approach, the focus of learners is to ensure high grades in assessment by organizing their work and time management [7-9]. Items in this instrument were rated using a 5-point Likert scale, where a score of 5 indicates agree, 4 indicates agree somewhat, 3 indicates unsure, 2 indicates disagree somewhat, 1 indicates disagree. Scores were created by summing the sub-scales for each of the three main approaches. Computers typically perform scoring using software programs like the Statistical Package for Social Sciences (SPSS). Each item is set to a variable and a scale total is produced by creating a new variable by summing up the items. The highest mean was taken to indicate the predominant learning approach in students.

The educational environment based on students' perceptions across 5 subscales was evaluated using the 50-item Dundee Ready Educational Environment Measure (DREEM) is as follows:

- a) Students' Perception of Learning (SPL) - 12 items; maximum score is 48
- b) Students' Perception of Teachers (SPT) - 11 items; maximum score is 44
- c) Students' Academic Self-Perceptions (SASP) - 8 items; maximum score is 32
- d) Students' Perception of Atmosphere (SPA) - 12 items; maximum score is 48
- e) Students' Social Self-Perceptions (SSSP) - 7 items; maximum score is 28

The questionnaire generates an overall score for the course. DREEM gives a global score (maximum score out of 200) for the 50 items. The higher the total scores, the better the environment. McAleer and Roff [6] suggested that a total DREEM mean score of 0 to 50 indicates a poor learning environment, an average score of 51 to 100 indicates a learning environment with multiple problems and an average DREEM score of 101 to 150 indicates a positive rather than a negative environment, while mean scores between 151 and 200 indicate that students perceive the educational environment as excellent. DREEM facilitates comparisons between different courses, as well as within a single course [5, 6]. The questionnaires were also rated based on a 5-point Likert scale. The Likert scale is used to measure all the items except nine. The system scores these nine negative statements (Items 4, 8, 9, 17, 25, 35, 39, 48 and 50) in reverse order, indicating disagreement with the negative statement and a positive result.

2.6. Statistical analysis

Data were collected in MS Excel and then analyzed using the statistical tool SPSS version 24. Mean and standard deviations were used for measuring the central tendency of continuous variables, and the Chi-square test was used, while proportions and percentages were used for categorical variables. An unpaired t-test was performed to test the differences in means across the study years. The $p < 0.05$ was considered statistically significant.

3. Results

Table 1 provides the demographic parameters of the participants. A total of 354 dental students from all years volunteered, with 82.8% of them being female.

The ASSIST short-form questionnaire was used to analyze the learning approaches of 354 dental students. The mean deep approach scores were the highest from the 3rd-year students (24.67 ± 2.74). Mean strategic approach scores improved from the first to the second year, then declined in the fourth year. Finally, the overall score of the surface approach remained stable across the year (Table 1).

Table 1: Demographic details of the dental students with the distribution of learning approaches

a: Data are presented as number (%) b: mean \pm standard deviation (SD)

Compared to gender, results indicated that female participants had more strategic approaches ($p = 0.042$) to learning than males (Table 2).

Table 2: Gender variations of dental students in selecting approaches to learning

Gender	1 st year (n= 94) (%) ^a	2 nd year (n=83) (%)	3 rd year (n=83) (%)	4 th year (n=94) (%)	Total (n=354) (%)
Male	17(18.1%)	17(20.5%)	12(14.4%)	15(15.9%)	61(17.2%)
Female	77(81.9%)	66(79.5%)	71(85.5%)	79(84.1%)	293(82.8%)
Learning approaches	Mean \pm SD ^b	Mean \pm SD	Mean \pm SD	Mean \pm SD	Mean \pm SD
Deep approach	23.58 \pm 4.04	24.18 \pm 3.65	24.67 \pm 2.74	23.87 \pm 3.33	23.94 \pm 3.64
Strategic approach	21.33 \pm 4.91	22.95 \pm 4.10	22.90 \pm 4.96	22.29 \pm 4.71	22.24 \pm 4.64
Surface approach	21.29 \pm 4.60	21.60 \pm 3.98	21.90 \pm 2.73	21.57 \pm 3.61	21.52 \pm 4.01

Learning approaches	Gender		p-value ^b
	Male Mean ± SD ^a	Female Mean ± SD	
Deep approach	23.24±3.72	24.09±3.61	0.152
Strategic approach	20.98±4.76	22.51±4.58	0.042
Surface approach	21.46±3.94	21.53±4.03	0.913

a: Data are presented as mean ± standard deviation (SD) b: $p < 0.05$ was considered statistically significant

The mean subscale analysis found that 2nd- to 4th-year students significantly outperformed 1st-year students in organized studying (strategic approach) ($p=0.001$). Syllabus-bound (surface approach) analysis revealed that 3rd years were significantly higher in scoring compared to 1st and 2nd-year students ($p=0.049$) (Table 3).

Table 3: Mean (±SD) of sub scale scores of learning approaches among dental students

Learning	1 st year (n= 94)	2 nd year (n=83)	3 rd year (n=83)	4 th year (n=94)	p-
<i>Deep approach</i>					
<i>Seeking meaning</i>	4.00±1.08	4.24±1.00	4.38±0.669	4.25±0.83	0.217
<i>Interest in ideas</i>	3.69±1.26	3.66±1.10	3.95±0.80	3.57±1.27	0.647
<i>Relating ideas</i>	7.87±1.59	8.11±1.47	8.19±1.12	7.95±1.37	0.656
<i>Use of evidence</i>	8.02±1.70	8.16±1.35	8.14±1.10	8.08±1.35	0.936
<i>Strategic approach</i>					
<i>Time management</i>	7.43±1.91	7.87±1.60	8.23±1.44	7.51±2.07	0.175
<i>Alert to</i>	3.50±1.30	3.29±1.32	3.48±1.25	3.31±1.36	0.713
<i>Achieving</i>	7.18±1.90	7.84±1.70	7.57±2.03	7.79±1.47	0.063
<i>Organized</i>	3.21±1.31	3.94±1.02	3.62±1.35	3.68±1.20	0.001
<i>Surface approach</i>					
<i>Lack of purpose</i>	3.99±1.14	3.98±0.95	3.71±0.71	3.75±1.02	0.354
<i>Syllabus bound</i>	2.69±1.43	2.87±1.20	3.52±0.87	3.04±1.36	0.049
<i>Unrelated</i>	7.40±1.92	7.28±1.69	7.61±1.53	7.63±1.50	0.617
<i>Fear of failure</i>	7.18±2.07	7.47±1.59	7.04±1.46	7.14±1.72	0.596

a: Data are presented as mean \pm standard deviation (SD) b: $p < 0.05$ was considered statistically significant

Results of the analysis of the DREEM score showed significant differences in all the students' perceptions over four years through a decrease in the total DREEM score from 129.66 in the 1st year to 105.71 in the 4th year ($p < 0.001$) (Table 4).

Table 4: Comparison of mean DREEM scores of dental students across academic years

Domains	1 st year Mean \pm SD ^a	2 nd year Mean \pm SD	3 rd year Mean \pm SD	4 th year Mean \pm SD	Average means score	p- value ^b
Students' perception of self	32.94 \pm 5.4	30.40 \pm 6.0	33.31 \pm 4.39	26.09 \pm 6.1	29.98 \pm 6.4	<0.001
Students' perception of others	28.52 \pm 5.2	27.71 \pm 4.77	27.50 \pm 3.8	22.83 \pm 5.4	26.37 \pm 5.7	<0.001
Students' academic self-perception	21.34 \pm 4.79	21.82 \pm 4.32	23.06 \pm 4.35	17.94 \pm 4.45	20.46 \pm 4.85	<0.001
Students' perception of social self	31.31 \pm 6.07	28.42 \pm 6.33	29.88 \pm 6.14	25.90 \pm 6.13	28.62 \pm 6.52	<0.001
Students' social self-perception	15.55 \pm 3.74	15.57 \pm 3.20	13.94 \pm 2.74	12.95 \pm 3.84	14.61 \pm 3.76	<0.001
Total (Global)DREEM	129.66 \pm 5.07	123.92 \pm 4.92	127.69 \pm 3.86	105.71 \pm 5.22	121.00 \pm 5.46	<0.001

a: Data are presented as mean \pm standard deviation (SD) b: $p < 0.05$ was considered statistically significant

Table 5: Mean \pm SD of DREEM item score with domain of dental students across academic years(heading should of table 4 here)

Domains	1 st year (n=94) Mean \pm SD	2 nd year (n=83) Mean \pm SD	3 rd year (n=83) Mean \pm SD	4 th year (n=94) Mean \pm SD
<i>I)Students perception of learning</i>				
<i>Items:</i>				
1.I am encouraged to participate in class	3.35 \pm 0.59	3.18 \pm 0.68	3.25 \pm 0.44	3.22 \pm 0.51
7.The teaching is often stimulating	2.73 \pm 0.73	2.75 \pm 0.83	3.00 \pm 0.63	2.79 \pm 0.72
13.The teaching is student-centred	2.96 \pm 0.81	2.69 \pm 0.78	3.19 \pm 0.54	3.12 \pm 0.45
16.The teaching is sufficiently concerned to develop my	3.04 \pm 0.71	2.64 \pm 0.94	3.19 \pm 0.54	3.02 \pm 0.69
20.The teaching is well focused	3.07 \pm 0.82	2.96 \pm 0.70	3.00 \pm 0.51	3.10 \pm 0.68
22. The teaching is sufficiently concerned to develop	2.79 \pm 0.90	2.55 \pm 0.94	2.56 \pm 0.62	2.65 \pm 0.58
24. The teaching time is put to good use	3.13 \pm 0.64	2.69 \pm 0.85	3.06 \pm 0.44	2.82 \pm 0.82
25 The teaching over-emphasizes factual learning	1.91 \pm 0.93	1.60 \pm 1.02	1.75 \pm 0.68	1.82 \pm 0.61
38.I am clear about the learning objectives of the	2.63 \pm 0.96	2.80 \pm 0.79	2.44 \pm 0.62	2.81 \pm 0.74
44. The teaching encourages me to be an active learner	2.74 \pm 0.81	2.52 \pm 0.95	2.63 \pm 0.80	2.82 \pm 0.79
47. Long-term learning is emphasized over short-term	2.76 \pm 0.85	2.55 \pm 0.88	3.00 \pm 0.63	2.40 \pm 1.19
48. The teaching is too teacher-centred	1.82 \pm 1.09	1.47 \pm 0.92	1.81 \pm 0.75	1.84 \pm 1.00
<i>II)Students' perception of teachers</i>				
2.The teachers are knowledgeable	3.67 \pm 0.55	3.63 \pm 0.53	3.44 \pm 0.62	3.52 \pm 0.35
6. The teachers are patient with patients	2.57 \pm 0.79	2.84 \pm 0.78	3.19 \pm 0.75	2.99 \pm 0.65
8. The teachers ridicule the students	2.22 \pm 1.14	1.89 \pm 0.98	2.00 \pm 0.63	2.14 \pm 0.95
9. The teachers are authoritarian	1.73 \pm 1.04	1.69 \pm 0.96	1.38 \pm 0.61	1.61 \pm 0.85
18. The teachers have good communications skills with	2.78 \pm 0.81	3.02 \pm 0.69	2.96 \pm 0.70	3.00 \pm 0.62
29. The teachers are good at providing feedback to	2.86 \pm 0.92	2.78 \pm 0.89	2.56 \pm 0.96	2.63 \pm 0.81
32.The teachers provide constructive criticism here	2.32 \pm 1.09	2.51 \pm 0.95	2.38 \pm 0.80	2.44 \pm 0.65
37.The teachers give clear examples	3.18 \pm 0.77	2.81 \pm 0.74	3.00 \pm 0.63	3.05 \pm 0.56
39.the teachers get angry in class	1.68 \pm 1.09	1.63 \pm 0.83	3.19 \pm 0.54	2.75 \pm 0.87
40. The teachers are well prepared for their class	3.39 \pm 0.62	3.07 \pm 0.71	3.19 \pm 0.54	3.22 \pm 0.45
50. The students irritate the teachers	2.11 \pm 1.17	1.84 \pm 1.00	2.04 \pm 0.56	1.87 \pm 0.92
<i>III)Students' academic self-perception</i>				
5. Learning strategies which worked for me before	2.55 \pm 0.91	2.61 \pm 0.83	3.19 \pm 0.75	3.06 \pm 0.88
10. I am confident about my passing this year	3.29 \pm 0.78	2.56 \pm 1.06	3.56 \pm 0.52	2.73 \pm 1.08
21. I feel I am being well prepared for my profession	2.67 \pm 1.03	2.85 \pm 0.89	2.81 \pm 0.98	2.88 \pm 0.79
26.Last year's work has been a good preparation for	2.71 \pm 0.91	3.01 \pm 0.52	3.31 \pm 0.70	2.70 \pm 1.14
27. I am able to memorize all I need	2.19 \pm 1.06	2.45 \pm 0.88	2.44 \pm 0.62	2.69 \pm 0.79
31.I have learned a lot about empathy in my profession	2.77 \pm 1.05	2.56 \pm 0.96	2.63 \pm 0.80	2.59 \pm 0.97
41. My problem-solving skills are being well developed	2.33 \pm 1.02	2.72 \pm 0.84	2.56 \pm 1.15	2.52 \pm 0.95
45. Much of what I have to learn seems relevant to a	2.83 \pm 0.79	2.82 \pm 0.79	2.94 \pm 0.68	2.81 \pm 0.56
<i>IV)Students' perception of atmosphere</i>				
11. The atmosphere is relaxed during the ward teaching	3.01 \pm 0.83	2.57 \pm 0.84	3.00 \pm 0.63	2.55 \pm 1.12
12. This school is well time-tabled	3.27 \pm 0.87	2.69 \pm 0.78	3.06 \pm 1.06	3.12 \pm 1.02
17. Cheating is a problem in this school	1.76 \pm 1.28	3.29 \pm 0.78	3.18 \pm 0.77	2.81 \pm 0.74
23. The atmosphere is relaxed during the lectures	3.01 \pm 0.82	2.67 \pm 1.03	2.75 \pm 0.68	3.44 \pm 0.62
30. There are opportunities for me to develop inter-	2.73 \pm 1.08	2.71 \pm 0.91	1.87 \pm 1.20	3.19 \pm 0.75
33. I feel comfortable in class socially	2.88 \pm 0.89	2.19 \pm 1.06	2.50 \pm 0.63	2.00 \pm 0.63

34. The atmosphere is relaxed during	2.70±1.11	2.77±1.05	2.69±0.798	2.38±0.61
35. I find the experience disappointing	1.97±1.06	2.13±0.64	2.31±0.70	2.73±1.08
36. I am able to concentrate well	2.45±0.88	2.91±0.93	2.56±0.96	2.88±0.79
42. The enjoyment outweighs the stress of studying	2.60±1.16	2.63±0.96	2.56±0.51	2.70±1.14
43. The atmosphere motivates me as a learner	2.59±0.97	2.74±0.81	2.44±0.96	2.69±0.79
49. I feel able to ask the questions I want	2.35±1.15	2.76±0.85	2.94±0.57	2.59±0.97
<i>V)Students' social self-perception</i>				
3. There is a good support system for students who get	2.35±1.08	2.16±1.21	2.00±1.41	2.33±1.17
4. I am too tired to enjoy this course	0.30±0.80	0.64±0.59	0.81±0.23	0.56±0.12
14. I am rarely bored on this course	1.74±1.11	2.01±0.98	2.06±0.85	1.81±0.91
15. I have good friends in this school	3.37±0.90	2.52±0.95	2.81±0.75	2.67±0.62
19. My social life is good	2.77±1.07	2.55±0.88	3.00±0.63	2.53±0.80
28.I seldom feel lonely	2.24±1.15	1.47±0.92	2.19±1.04	2.46±1.15
46. My accommodation is pleasant	2.78±0.98	2.75±0.15	1.87±1.36	2.99±0.68

a: Data are presented as mean ± standard deviation (SD)

Item analysis highlights the patterns of the year's strengths and weaknesses. More strengths were observed in 4th year and weakness area in 2nd and 3rd year. Areas that require improvement were high for 2nd year, signifying 2nd year as a difficult phase for the dental students (Table 5,6).

Table 6: Year wise analysis of weakness, improvement and strength in educational environment

Dom ain	Weakness area Mean ≤2				Improvement area Mean 2-3				Strength area Mean ≥3.5			
	Year wise with item				Year wise with item				Year wise with item			
	1 st	2nd	3rd	4th	1 st	2nd	3rd	4th	1st	2nd	3rd	4th
SPL ^a	25, 48	25,4 8	48	25,4 8	7,13 22,3 8,	7,13, 16,2 0,22	22,3 8 44	7,22, 24,3 8,	N*	N	N	N
SPT ^b	9,3 9	8,9 39,5	8,9 50	9,50	6,18, 29,3	6,18, 29,3	8,18, 29,3	6,8, 18,2	2	2	N	2
SASP ^c	N	N	N	N	5,21 26,3	5,21, 27,31	21,2 7, ,	10,21	N	N	10	N
SPA ^d	17, 35	33	30,3 5	33	30,3 3 34,3	11,12, 23,3 0,	23,3 3 34,3	11,17, 30,3 4,35,	N	N	N	23
SSSP ^e	4	4,14, 28	3,4 14,4	4,14	3,19 28,4	3,15, 10	3,14, 28	3,15, 10,2	N	N	N	N
Total	7	10	10	7	24	33	24	32	1	1	1	2

a: Students' perception of learning b: Students' perception of teachers c: Students' academic self-perception d: Students' perception of atmosphere e: Students' social self-perception
N*: None

Table 7: Total results of DREEM score with interpretation

The students attributed the highest confidence to their academic self-perception

Dream scores and subscales	Maximum score of the	Mean	Percentage of	Interpretation [6]
Students' Perception of	48	29.98	62.45%	A more positive
Students' perception of	44	26.37	59.9%	Moving in the right
Students' academic self-	32	20.46	63.9%	Feeling more on the
Students' perception of	48	28.62	59.6%	A more positive
Student's social self-	28	14.61	52.17 %	Not too bad
Total DREEM score	200	121	50.5%	More positive than negative

(63.9%) and the least confidence to their social perception (52.17%) (Table 7). The mean score of the DREEM inventory of the present study is 121/200 (50.5%), which indicates a positive overall education environment for the students.

4. Discussion

The findings of this study showed significant variation in dental students learning approaches and educational environment in various academic years, highlighting the need for tailored educational strategies and support mechanisms.

For the students, learning becomes something “done to them” by the teacher and the curriculum becomes a collection of separate subjects [10]. In this study, comparing with the male students, female enrolment has significantly overtaken considerably more compared to previous years, indicating a change in gender dynamics in the profession agreeing with a similar study showing this shift (Table 1) [11].

Table 1 also shows that third-year students scored the highest mean deep approach score. This aligns with Entwistle's [12] findings, which suggest that advancing academic levels often correlate with deeper learning. Dental students need to reproduce the knowledge and master the concepts thoroughly. The deep learning approach can definitely help students gain a more profound understanding of the concepts, meaning and mechanisms that are important to them.

A comparison of study approaches adopted by male and female students in the present study indicated that female students employed more effective study strategies ($p = 0.042$) (Table 2). This is in line with the findings by Bickerdike et al. [15], suggesting that females have a better organization or different intrinsic motivations for learning compared to male students. The absence of significant differences in deep

approach scores indicates that both genders engage similarly in deep learning processes, which is consistent with the findings of Entwistle and Tait [16], who argue that context is more significant than gender in learning approaches.

Strategic approach scores improved from year 1 to 2 but declined in year 4, suggesting stressors for students nearing their final year. There was significant improvement in organized studying among 4th-year students ($p < 0.001$), which reflects the development of effective study management skills [13]. The year did not show any significant differences in the deep approach subscales, but the 3rd-year students significantly outperformed the 1st and 2nd years in the syllabus-bound subscale ($p = 0.049$) (Table 3). Previous research has found that demonstrating familiarity with the curriculum enhances student performance [14]. Motivating students and developing their self-regulation skills could boost their engagement in coursework and encourage the use of both strategic and deep approaches.

The study indicated a steady decline with time in dental students' perceptions of their educational environment as reflected in DREEM scores. Scores peaked in the perceptions of learning, particularly in students in the 3rd year, but a marked drop was observed by the 4th year ($p < 0.001$) (Table 4). This aligns with Hutchinson's [17] assertion that in more advanced years, students' enthusiasm tends to diminish due to increased academic and clinical pressures.

Analysis of the student's perception of learning indicated a steady decline across the years ($p < 0.001$) (Table 4). Lectures, which are primarily teacher-centered and focused on the transfer of factual knowledge, are considered the main mode of teaching strategy in the current institution. According to adult learning theory, we should base teaching on the principle of active learning, where learners actively participate in the learning process [18]. There should be more focus on developing students' skills rather than transferring factual knowledge [19].

However, the Perception of Teachers scores were also on the decline, with the highest scores being in the 1st year and the lowest in the 4th year ($p < 0.001$) (Table 4). The findings corroborated the research by Pololi and Price [20], indicating that senior students frequently view teaching as more directive and less supportive. This suggests that faculty training on student-centered teaching methods could counteract this trend. The principle of adult learning dictates that teaching should be learner-centered, transforming the teacher's role from a transmitter of knowledge to a facilitator [21]. Teachers should actively engage their students in learning and reflect on what they learn, rather than ridiculing them [18].

Academic self-perception showed high confidence in the 3rd year that dropped down in the 4th year ($p < 0.001$) (Table 4). These findings indicate the necessity for a shift in

teaching-learning strategies. Teachers continue to employ traditional-based teaching methods, teaching basic and clinical sciences independently. This is why students struggle to make a connection between their knowledge and their actions. Radcliffe [22] reported similar results indicating clinical anxiety in the final-year students, which impacts self-efficacy. This finding suggests that final-year students need mentorship and career preparation programs.

Perception of Atmosphere also exhibited a downward trend, with 1st-year students scoring highest and 4th-year students with the lowest ($p < 0.001$) (Table 4). Students tend to perceive the educational environment as pressured as they progress through the years, as reported by Roff et al. [5]. A favourable supportive atmosphere could positively influence these perceptions, particularly in the final years.

Results for social self-perception (Table 4) are consistent with the findings of Aldowsari et al. [23] and indicate that peer support was becoming weaker over time, supporting the assertion that a strong social network is essential for well-being.

A notable difference was observed in Item 3 (students were stressed) among all the years (Table 5). Academics and the environment are the sources of stress. The absence of a student support system in the current institution underscores the need to establish one, along with counselling cells, to enable students to perform to their fullest potential. The results of this study align with the theory proposed by Roff et al. [6], which suggests that student feedback on changes in health professions education can lead to increased student satisfaction. Furthermore, these findings are strongly suggestive of remedial action in curriculum design and teaching strategies.

We should monitor the continuous improvement of the educational environment through student perceptions to define its strengths and weaknesses [24]. Mc Roff guideline interpretation states that if the mean score is ≥ 3.5 , it is considered a highly positive point. A mean score between 2 and 3 suggests that numerous aspects of the environment require improvement. A mean score of less than 2 indicates areas of concern that require attention. The analysis (Table 6) reveals that the 2nd and 4th years have the highest areas requiring improvement, particularly in students' perception of teaching, a concern that has remained consistent over time.

Table 7 highlights the overall DREEM score of 121/200 (50.5%), which was within the range of 101-150 and is suggestive of a more positive educational environment than negative [6, 25]. This score is comparatively lower than the studies done in Malaysia [26] and Nepal [27], with mean scores of 125.3/200 and 129/200, respectively.

5. Limitations:

Since this study is cross-sectional, it captures only a snapshot of students' experience at different levels of their academic ladder, which does not account for changes over time. This study's focus on a single institution and a single discipline limits its generalizability to other institutions or disciplines.

6. Conclusion

This study demonstrated that dental students predominantly adopt a surface approach during their preclinical year and start adopting a deep approach later in the 3rd and 4th years when they experience a transition to clinical training. Therefore, these findings indicate a need for a shift in teaching strategies from large class lectures to small group problem-based learning, which will foster the development of higher order skills and enable the integration of acquired knowledge into clinical practice. Although overall students have assessed the education environment as positive, there is a need for improvement in all five domains of students' perception. We recommend conducting further longitudinal studies across different academic years, multiple institutions, and disciplines, based on this baseline data. Educational administrators can use the insights from this study to refine educational strategies, equipping students with the clinical and interpersonal skills needed to deliver patient-centered care.

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Conflict of interest

The authors have no conflict of interest to declare

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Ethical approval

This study received approval from Kannur Medical College Institutional review board (Dated: 15/12/2023, Number:11/2023) after which informed consent was taken from the participants.

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